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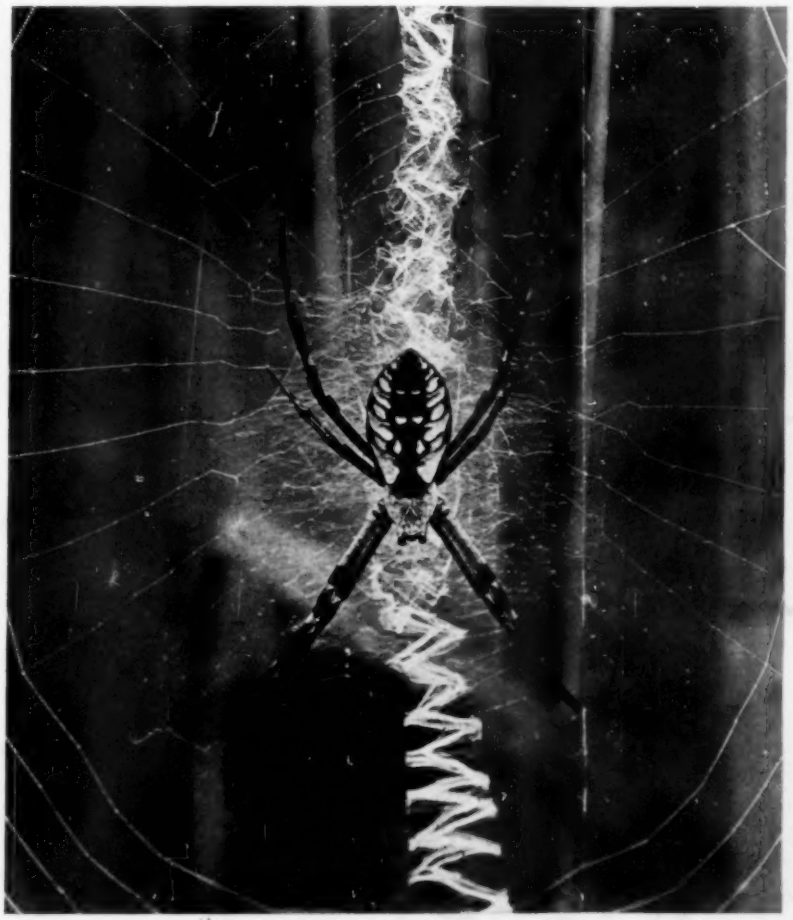
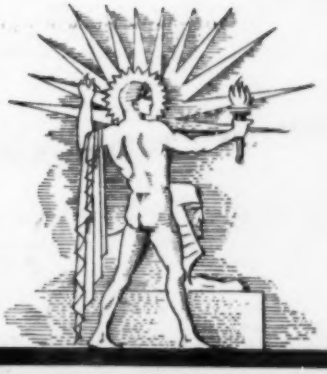
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •





AUGUST 24, 1935

Weaver of Snares

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A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXVIII No. 750

The Weekly Summary of Current Science

Published Every Saturday by

SCIENCE SERVICE

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DO YOU KNOW?

Egypt had inheritance taxes in 700 B.C.

Meteor Crater in Arizona is a mile in extent and 500 feet deep.

The larva of the clothes moth has a skin so transparent that the larva becomes the color of the food it eats.

Except for snake venoms and a few other poisons, tolerance toward poison increases with repeated small doses.

Hens are a prey to at least nine species of lice, several species of mites and at least two kinds of fleas, says a poultry specialist.

Sculpture by some blind art students shows a surprising resemblance to the work of primitive peoples and early European artists.

The most complete library on the eye and its diseases in the world is said to be the 5,000 volumes at the Royal London Opthalmic Hospital.

Scientists studying the effects of diet on experimental animals find that 21 days in the life of an albino rat correspond to 21 months in the life of a child.

The tallest group of people in the United States are the mountaineers of North Carolina.

In upper New York state alone, there are on record 335 typhoid carriers exclusive of those in state institutions.

New York has a "toyery" where children can borrow toys free of charge, as they take books from a public library.

The French National Museum of Natural History, in Paris, was founded in 1635 and celebrated its tercentenary this year.

A gladiator carved from a single stone and weighing over 60 tons guards the entrance to the new Archives Building in Washington.

Attempts to restore Egyptian mummies to their original state by chemical solution containing sodium hydroxide have so far proved unsuccessful.

Zapotec Indians in Mexico had painless dentistry a thousand years ago, says an archaeologist, for they used a natural anesthetic growing wild in their country.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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Why are porcupines "tinned"? p. 117.

ANTHROPOLOGY

Primitive Skulls Declared Equivalent to Advanced Forms

"ALL MEN are created equal." Thomas Jefferson boldly pronounced this fundamental dogma of democracy as self-evident.

Since his time, apologists and rationalizers have been much occupied in shaving and chiseling off the edges and corners of this "hard saying," until we are left with a diluted doctrine based on oblique admissions of self-evident natural inequalities.

Comes now a world-known scientist, Dr. Eugene Dubois, discoverer and describer of *Pithecanthropus erectus*, Ape-Man of Java, most primitive known fossil human species (if indeed it is human), and bolder even than Jefferson declares a natural and physical parity between the two most widely different of living races. The proud white man of Europe and the poor, vanishing black of Australia, "lowest" of living human stocks, achieve closely equivalent ratings for their respective brain sizes when measured by a yardstick of his devising.

Not that Dr. Dubois claims absolute equality in cranial capacity. European white men average 1450 cubic centimeters skull content; white women 1300. Australian black males average slightly less than white women in cranial capacity; their women have a cranial content of a little under 1150 cubic centimeters.

These measurements, however, Dr. Dubois designates as only "apparent cephalizations." To obtain a figure representing a "real cephalization," it is necessary to take into consideration the body which the brain is called upon to manage. One must introduce into the formula factors representing bodily height and weight, and especially size and relative strength of the muscles.

The Netherlands anthropologist first obtains cranial justice for the white woman. After allowing appropriate weighings for the lesser female size, smaller and softer female muscles and other factors requiring compensation, he comes to the conclusion that "it appears to be proved with certainty, that the real cephalization of woman is equal to that of man."

Turning then to the humble black brother of the Australian bush, he gives him the benefit of the same allowances for less height, inferior physique and smaller muscular strength. Again the outcome is that "the real cephalization of the Australian aborigine is equal to that of the European."

But Dr. Dubois' doctrine of fundamental human equality, at least so far as head-body ratio is concerned, is even more sweeping. Calling attention to the establishment of similar parities in real cephalization among white men, Japanese, Eskimos and the extinct Neandertal race, he concludes: "It again bears evidence thereof that man did not gradually progress in human organization, but came into existence as one finished genus, and that indeed all the multiform types of man, in the present and in the past, belong to one and the same stage of natural animal organization."

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ELECTRICITY

World's Tiniest Motor Built by Russian Youth

AN ELECTRICAL motor built in ten days by a 21-year-old Moscow student is now the smallest machine of its kind in the world. Dwarfing other tiny motors, it is about the size of a large fly. It weighs only .37 gram.

Constructed by Yuri Yuremin, a student at the Moscow Institute of Non-Ferrous Metals, it consists of 31 parts. A four-volt pocket-flashlight battery can operate it, and it can also run on regular city current reduced in voltage by a transformer.

The current-carrying parts are of brass, and all insulating parts are ebonite. Aluminum rivets fasten it to a celluloid base. The armature measures about .16 inch across, and has 380 windings of wire not quite .002 inch in diameter.

Science News Letter, August 24, 1935

ASTROPHYSICS-METEOROLOGY

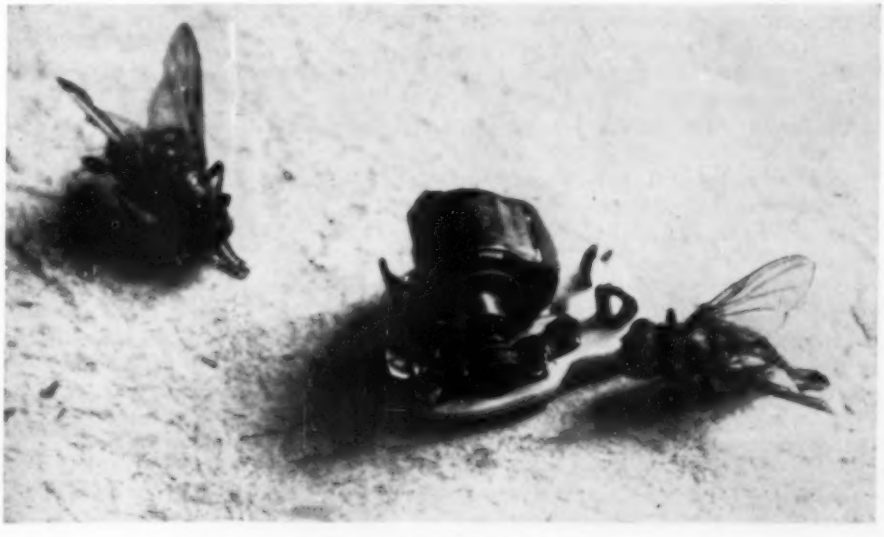
Cycle of 23 Years Dominates Heat and Light of Sun

RADIATION of heat and light from the sun fluctuates in twelve distinct cycles, but among them the dominant one is a 23-year period. A great variety of events on earth follow this 23-year cycle, ranging from the floods of the Nile to the abundance of codfish.

An analytical study of the sun's cycle activities, carried on for many years by Dr. C. G. Abbot, secretary of the Smithsonian Institution, has been brought to completion and has been published in a special bulletin of the Institution.

The superposition of cycles in solar radiation presented great difficulties in their analysis and study, for sometimes they coincide, giving great stress to their effects, and sometimes they run against each other, resulting in mutual cancellation. However, continual refinement of instruments and growing skill in observation, combined with new methods of statistical handling of the results, have enabled Dr. Abbot to unsnarl what at the beginning looked like a hopeless tangle of data.

Dr. Abbot is proceeding with great scientific caution in the application of his results to the problem of long-range



TWO FLY-POWER MOTOR

forecasting of weather changes and tendencies. He made a forecast of the general climatic conditions for 1934 which proved to be substantially correct, but he refrained from publishing it in advance, being much more concerned with checking up on his method and its results than in its immediate use. Similarly, he has made forecasts for 1935 and 1936—and locked them up in a vault. He will not take them out until the returns are all in for their respective years. Then he will submit himself to an impartial scoring.

His results on the 1934 forecasts, which were drawn for 66 different places, range in his own estimation from "excellent," when the course of events followed the prediction very closely, to "bad," when events and predictions did not fit at all. The score runs: excellent, 27 per cent.; good, 42 per cent.; indifferent, 17 per cent.; bad, 14 per cent.

Science News Letter, August 24, 1935

MEDICINE

New Cancer-Causing Chemicals Are Unique in Structure

Capable of Causing Highly Malignant Tumors, But Action Is Slower Than That of Other Compounds

ANOTHER advance in the search of physicians to discover the cause of cancer has just been revealed at Cambridge, Mass., in the report of Prof. Avery A. Morton and Dr. Daniel B. Clapp of Massachusetts Institute of Technology and Dr. Charles F. Branch of Evans Memorial Hospital, Boston, that they have discovered two new chemicals which will produce the disease in mice.

The two new cancer-causing chemicals are known as triphenylbenzene and tetraphenylmethane. In their preliminary account (*Science*, Aug. 10), the Cambridge scientists state, "In a year's time 12 out of 60 mice had well-developed tumors of a highly malignant type. In the case of tetraphenylmethane 25 mice were painted twice weekly with a 0.5 per cent. solution in benzene. After the same period well-developed epitheliomata were present in eight cases. It is interesting to note that the percentage of positive results is relatively high in spite of the long time necessary to induce the growth."

The carcinogenic action of the two new hydrocarbon compounds is considerably slower than previously reported chemicals which have a similar action. And they differ markedly in chemical structure.

The cancer-causing chemicals known up to now have, in general, consisted of numerous rings made up of carbon atoms. Four or five of these carbon rings were believed in some cases to be linked in a single molecule. Accompanying these condensed ring structures was also a characteristic atom arrangement which chemists call the phenanthrene nucleus.

On studying such widely differing materials as the bile acids and the sex hormones chemists previously had also noted an arrangement of atoms similar to those found in the cancer-causing chemicals.

Proof was not certain, but the suspicion arose that perhaps in the human body cancer-causing substances might be created.

What interests medical scientists in the two new compounds is that neither of them can be derived from the bile or the sex hormones. There is also a complete absence of the condensed ring systems and a lack, too, of the phenanthrene nucleus.

"In an effort," the scientists explain, "to find a common ground on which these widely different classes of carcinogenically active agents can stand we may make the tentative assumption that in the hydrocarbons so far discovered the property of producing cancer resides in the benzene nucleus as modified or affected by substituents attached in either the condensed or open manner. Work is now in progress to limit more exactly the nature and position of the substituents."

Describing the structure of the newfound cancer-producing chemicals, Drs. Morton, Clapp and Branch report:

"In triphenylbenzene a single ring holds three other benzene rings attached in the 1, 3, 5 positions, but in tetraphenylmethane no benzene ring is attached to another. The linkages in this last instance are through a central carbon atom."

Science News Letter, August 24, 1935

India was famous for its steel in the days of Alexander the Great.

MEDICINE

New Discovery Widens Field Of Necessary Research

By PROF. AVERY A. MORTON
Massachusetts Institute of Technology

PURE organic compounds which will produce cancer have lately been the subject of considerable interest. One series of these substances, discovered in England, consists of compounds made up of benzene nuclei, each condensed to the other at two or more points. The framework which results bears some outward relationship to that of the sterols, bile acids, and hormones. It was therefore supposed that cancer might originate from deranged metabolism of some product occurring naturally in the animal body.

The recent work of Morton, Branch, and Clapp shows that the production of cancer by pure hydrocarbons is much more general than supposed. Two substances, triphenylbenzene and tetraphenylmethane (known only in the organic laboratory), consist of benzene nuclei in which each portion is attached to the rest of the molecule at only one point. Both are cancer-producing, although their structure is absolutely different from that of other known agents.

The discovery widens the field of cancer research and requires the examination of a large number of organic compounds to see if they possess the power to produce tumorous growths. By removing the specific character of the organic causative agent a broader basis will be needed in explaining the action of these compounds.

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PUBLIC HEALTH

Scattering X-Rays Tell of Dust Danger

X-RAYS, scattering upon striking atmospheric dust, warn of the deadly particles of free silica that make certain industrial jobs extra-hazardous.

How this new task has been added to the long list of beneficent works performed by the invisible penetrating rays, was related by Prof. G. L. Clark and D. H. Reynolds of the University of Illinois, before the meeting of the American Chemical Society at San Francisco.

Other dusts make the air thick and produce discomfort, but the real peril to workmen comes from free or uncombined silica. Methods hitherto in use by public health investigators have been diffi-

cult and sometimes not dependable.

X-ray scattering or diffraction, however, is claimed by its discoverers to be both more rapid and more sure than any hitherto employed. The method depends on the fact that when a thin beam of X-rays strikes any substance it is diffracted or scattered, and that each substance has its own characteristic "diffraction pattern." The pattern produced by X-rays passing through a mass of silica particles, for instance, cannot be duplicated by any other substance.

Science News Letter, August 24, 1935

METEOROLOGY

Drought Returns to West, Intensified by Heat

RETURN of drought to the West, intensified by another week of simmering heat, has been definitely recognize by U. S. Weather Bureau in its regular weekly weather and crop summary.

"West of the Mississippi River a few areas still enjoy favorable growing conditions, . . . but drought persists over most other sections," the report states. "In the Plains States rain is seriously needed rather generally; pastures have become dry; late crops deteriorated in most places. . . In general, growing conditions now are less favorable than at any time during the summer."

Science News Letter, August 24, 1935

GENERAL SCIENCE

Freedom and Organization Both Needed in Research

SCIENCE, to be fruitful, must be free. To make its fruits socially available, science must be organized.

How to reconcile this seeming antithesis receives the attention of Secretary of Agriculture Wallace, in a brief essay in the Department Yearbook, just issued.

"There is really only one rule; namely, that scientific men shall be allowed to follow the truth," says Secretary Wallace. "Science cannot be blueprinted and pushed forward on a schedule. Often scientists should be under no obligation to produce immediate results. Sometimes, on the other hand, they must answer emergency calls. The great thing, in directing science, is not to regiment it; for that would be to kill it.

"We combine organization with freedom in our political life. We are trying to do the same in the economic sphere.

"There is an identical problem in science. Organization is necessary in this field, too. Modern science is cooperative. Scientific men cannot work in isolation without funds, equipment and communication with fellow workers.

"But the organization of research, particularly in studies that affect economic interests, is difficult. It tempts us to anticipate findings. This temptation we must resist. Otherwise the research is spurious and the research morale declines. Science is either free or dead. In organizing research we must not destroy its nature and leave only a mechanism.

"How to organize research without regimenting the research personnel is a problem that needs further study. From the organization to the regimentation of science, the descent is easy. It is imperative to avoid this calamity.

"The principal thing that distinguishes the progressive from the decadent countries is mental freedom; and in science this quality is indispensable."

Science News Letter, August 24, 1935

ONE PORCUPINE: IN TIN

The "fretful porcupine" becomes fretful indeed when he is sick. The veterinary force at the New York Zoological Park had a hard time dealing with these prickly problems, until some one thought of making a hinged cylinder of tinplate in which to confine the patient while he was being examined and treated.

AERONAUTICS

Stratosphere Glider Being Constructed in Russia

THE FIRST stratosphere glider in the world, claimed to be capable of making over 250 miles an hour in the stratosphere, is being built by the Experimental Institute of the Commissariat of Heavy Industry.

Consisting in part of a balloon such as has been used in past stratosphere ascents, it will have a glider attached to a special frame in the lower part of the gas envelope, instead of the usual spherical gondola. There will be room for two persons in the hermetically sealed cabin of the glider.

When an altitude of about 12.5 miles has been attained, construction is such that a lever can be used to detach the glider from the balloon, and start it into a nose dive, tapering off into a long glide.

Soviet scientists predict that at this altitude the speed of the glider will be 266 miles an hour, due to the rarefied atmosphere, and consequent lessening of frictional drag.

Scientific data on the phenomena of a falling body in the stratosphere will be obtained which would be impossible to get in an ordinary stratosphere balloon, because of the comparatively slow descent with the buoyant gas bag attached.

Science News Letter, August 24, 1935

CONSERVATION

Taming Ol' Man Ribber

Scientists Lay Plans to Keep Water, Most Valuable Of Our Mineral Resources, as Servant, Not Enemy

By DR. FRANK THONE

GOLD is not the most precious of America's mineral resources. Oil is not. Neither is copper, or coal, or iron.

The most valuable mineral we have is water.

Common water, the stuff we drink, and wash ourselves and our clothes in, that we use to irrigate our fields, float our boats, put out our houses when they catch fire. Water, which we long for as a lost friend in drought, and dread as a destructive demon in time of flood. Water, which we waste lavishly, pollute shamelessly with factory wastes and city filth. Water, the fluid of life, the fluid of death.

"Free as water" has been for ages and still is a proverb-phrase taken for granted by everybody. It is to be had for the taking, without even the formality of asking. Only in the world's most arid and forbidden places can it be sold as a commodity. Elsewhere, to ask men to balance it against silver or gold is looked upon—and resented—as effrontery. So fixed is this idea in our psychology that there is a widespread practice on the part of city water works to charge their patrons for services rendered in delivering the water, but to insist that the water itself is not an object of sale. The water is free.

But as we approach maturity as a nation, it begins to be borne in upon our sobering minds that while water is free to use, it cannot safely be left free to abuse. If we waste it in the spring, we may have the distress of seeing our town well run dry in a droughty summer. If a town or factory pollutes a stream, communities farther down, that must drink from the same stream, will have a sympathetic audience if they curse us out as reprobates, and maybe have the law on us. If we over-cut our forests and overplow our fields, we are ruined by erosion, and folks downstream are equally ruined by the floods we loose, with their aftermath of drifted sand and silt. For this sort of thing, water is not free.

In this day, when the irresponsible adolescence of our nation is ending, and reflective men among us are giving thought to what we, as a people in the earlier stages of social maturity, should be doing with ourselves and the land of our inheritance, water has come in for its full share of discussion and planning. Our lakes and rivers, even our brooks and springs, our swamps and seepage-places, are beginning to be seen as diversified parts of an organic unity, even as a people we are diversified and yet one.

There have been thoughtful examinations of water problems even of old time. Indeed, the world's earliest civilizations were in a sense the product of water problems, for canals, flood control, irrigation, city water supply, were what first brought the little city-states of ancient Egypt and Chaldea into being, and then operated to knit them together into kingdoms and empires.

Even in our own land, in the days of its earliest and loosest freedom, there had to be community action to obtain clean water, to dispose of wastes, to regulate port and river traffic. And as we have grown, there have been extensions of this "city-state" stage, where each municipality was a law unto itself, into wider regional "kingdoms," where several adjacent cities or states have found it mutually advantageous to ally themselves, as New York and the cities of the New Jersey shore in the Port of New York Authority, or the Ohio valley states in their cooperative attack on the flood problem.

It has not been easy for us to do things of this kind, for as a people we are extreme individualists, and as communities we are exceedingly parochial, each town keenly jealous of its own rights and advantages, and prone to eye the claims of the next town with hostile suspicion.

But it may be that we are developing a wider, a more national outlook, a greater willingness to let the other fellow have a fair share and not try to grab everything in sight for ourselves. And even if we have not evolved far along this pathway to a larger civic morality, at least a somewhat more far-sighted self-interest may move us to yield a little now in order to obtain greater advantages (or escape greater ills) somewhat later on.

Out in front of the rest of us, there are pioneers of larger cooperation, who by putting a dozen good heads together have evolved the beginnings of a full-sized national scheme for making the most of our national resources in water, and for mitigating the evils which this two-sided silvery servant of ours can inflict on us when we are not watching.

A notable accomplishment among the many hopeful plans that have been put forth lately for national betterment is the

A SERVANT NO LONGER DOCILE

We have stripped forests, plowed grasslands, that once controlled the flow of rivers. Is it any wonder that they have lost their old friendliness, and sometimes run amuck?

report of the Mississippi Valley Committee of the the Public Works Administration. It has operated under the chairmanship of Morris L. Cooke, an experienced engineer who can "dream dreams and see visions"—and then proceed to make them real. With him have been associated a number of other leaders in the field of engineering and economics—men in private practice, University men, Army men.

For a "sample river" to use in drawing up their first model plan they chose boldly—no less than the Mississippi system itself, probably the most important river drainage basin in the whole civilized world today. Though bold, their choice was wise; for in the vast stretch between the dry, thinly populated Great Plains that rise to the Rockies on the west, to the humid, rich, closely farmed lands of the inner East, encroached on by the jammed industrialism of the Pittsburgh region, there are all imaginable varieties and difficulties of water-use problems.

They have taken a wide view of their mandate: "Planning for the use and control of water is planning for most of the basic functions of the life of the Nation. We cannot plan for water unless we also consider the relevant problems of the land. We cannot plan for water and land unless we plan for the whole people. It is of little use to control rivers unless we also master the conditions which make for the security and freedom of human life . . . Under the proven system of democracy no plan can be imposed upon the people. Government may inform, educate, and guide. It may mobilize resources for the common task. It cannot dictate . . . We are but tenants and transients upon the earth. Let us hand down our heritage not only unimpaired but enriched to those who come after us."

Principles laid down by the committee shine with common sense: Improvements should be supported as nearly as can be determined in relation to their benefits; Federal participation should be freely entered into when national benefits are anticipated or national ills are to be averted; for the rest, render unto the state the things that are the state's, unto the town what is the town's. Encourage first such projects as are most likely to pay their own way in the long run: deepen the river if there is going to be enough traffic to justify it, otherwise go slow about spending the money. The same for irrigation projects. The same, within somewhat wider limits, for power projects; for it is recognized that though modern steam plants can often underbid water power in cost per installed kilowatt, nevertheless coal and oil are exhaustible, while rivers go on forever.

DIVIDE AND RULE

Little dams like this, added together in thousands, work wonders in controlling erosion and also accomplish something toward slowing the runoff waters that become floods when they reach the rivers.

The terrible evil of water erosion, which scourges East as well as West, and impoverishes in terrifyingly short time any region where it is permitted to go on unchecked, the committee sees largely as a problem of roots. To be sure, check dams and grading can do something against advanced gullying. But the most widespread damage is not so conspicuous as this; it is the insidious sheet erosion that takes away the irreplaceable topsoil, before gullying begins. Here the cure must be a living cure: reforestation, brushland that at the same time shelters game, restoration of range grass where plowland lays the soil bare to the raids of water and wind. Terracing slopes, where farming is too profitable to be abandoned, plus strips of long-lived, deep rooted crops following the contour lines and interdicting the gully-cutting downhill drainage.

Pollution, it goes without saying, is an intolerable evil. No community can be allowed to assume the privilege of befouling its downstream neighbor's drinking water with sewage, or poisoning it with factory wastes. Disposal plants are practicable for most of these sources of pollution, and for the still unconquered types of factory waste means of treatment may be found by more intensive research.

Recreation is recognized by the committee as a public interest of increasing importance, which can often be promoted as a co-project with such things as power or water-supply storage dams, navigation improvement, and game refuges in reforested lands on slopes salvaged from erosion and the breeding of floods. Recreation again is promoted by the re-flooding of lake and swamp lands, unwisely taken away from the ducks and fish during our national madness in land speculation of a generation or two ago.

Flood control comes sharply to the fore, especially now that the Great Drought of the early thirties has broken in spectacularly destructive deluges of rain in what had begun to be called the "dust bowl." Floods are recognized as problems practically throughout the entire great central basin, but the problems are particularly acute in the Ohio system, where northward-draining rivers from the Tennessee valley bring heavy freshets in late winter and early spring, and in the "delta country" ot the Lower Mississippi, from Memphis to the Gulf, which is the bottleneck through which all the drainage of the great inland empire must flow.

Most of us commonly think of flood protection in terms of levees, high earthworks that resist the frontal attack of the river with a stubborn frontal defense. Levees have their very important uses, but a dependence on them altogether is apt to be a snare and a betrayal, for if the flood becomes mighty enough to top them, the last state of that land becomes even worse than the first. (*Turn to Page* 126)

CHEMISTRY

Several Wines Blended to Make American Champagne

CHAMPAGNE can now be made in the United States rivaling that of European origin, thanks to the skill of American chemists.

Its manufacture was described before the food and agricultural division of the American Chemical Society meeting, in a report of Dr. D. K. Tressler of the New York State Agricultural Experiment Station, Dr. H. E. Goresline of the U. S. Department of Agriculture, and F. M. Champlin, owner of a large wine company in New York.

Since the white wine used as a base must be of extremely high quality, several white wines, including Catawba, Delaware, Elvira, and Dutchess, are blended to obtain the desired excellence.

Selected champagne yeast is added, together with the exact amount of sugar necessary to ferment and yield a pressure of 100 pounds to the square inch in the finished product. Sealed in the dark-green bottles, the champagne is then placed in cellars where the temperature can be carefully regulated—a necessary consideration in fermentation control.

It is during this secondary fermentation and aging that the champagne gains all of its clear, sparkling brilliance. The bottles are placed in an almost inverted position and shaken lightly as well as turned each day. This causes all the sediment to collect in the neck.

When all the sediment has collected, the neck of the bottle is frozen, and the frozen wine and sediment quickly removed. Sirups containing cognac and other flavorings are added, and the bottles again sealed, this time until they are re-opened upon some festive occasion.

Science News Letter, August 24, 1935

CHEMISTRY

Zinc and Paint Disagree; Chemist Finds Out Why

ZINC and paint are chemically hostile to each other, and that is why the average householder finds it so difficult and expensive to keep his zinc-coated eave-troughs decently painted up.

Dr. Henry J. Wing, chemist at the works of E. I. duPont de Nemours and Company, Wilmington, Del., told fellow-scientists at the San Francisco meeting of the American Chemical Society of his investigations into the causes of this expensive unfriendliness between paint and zinc.

He started with the commonly observed fact that paint flaking off zinc-coated metal is covered on its contact side with a white film. Evidently the paint has done something to the zinc to form this weakening stuff.

Then Dr. Wing made the purest and smoothest zinc surface possible, by coating small pieces of glass on one side with zinc in the same way that aluminum is used to make reflectors for modern astronomical telescopes. These he exposed to fumes from ordinary paint. The same white stuff formed on the mirrors.

Upon analysis this was found to be zinc formate, a compound of zinc and formic acid. Analysis of the white stuff from "natural" paint flakes off the surface of galvanized iron showed the same substance to be present. Paint removed from plain iron did not have it.

This solved the riddle, but the remedy has not yet been forthcoming. Before paint chemists can know how to make paint stick to zinc further research will be necessary.

Science News Letter, August 24, 1935

PHYSIOLOGY

Vegetable Fats Found Digestible and Nutritious

VEGETABLE fats are completely digestible and they satisfactorily fulfill the needs of the body for fat, according to Dr. Harry Steenbock of the University of Wisconsin.

Dr. Steenbock and his associates at the Wisconsin Experiment Station have confirmed the finding made at other experiment stations that lack of fat in the diet of experimental animals results in abnormal symptoms, including the stopping of growth. They found that white rats suffering from want of fat could be completely cured in from five to seven weeks by feeding them daily five drops of corn oil, 15 drops of lard, or 20 drops of a widely known vegetable fat.

The Wisconsin investigators found that all edible fats, animal or vegetable, are completely absorbed by the body if they will melt below body temperature. Hydrogenation of vegetable fats does not make them indigestible, therefore, unless it is carried so far as to give them a melting point of 100 degrees Fahrenheit or more. And this is not done with ordinary commercial vegetable fat.

Some fats are digested much more rapidly than others, Dr. Steenbock found. He pointed out, however, that it has not been proved that quick digestion is desirable, although it is popularly associated with "easy" digestion. Slowly digested foods have a certain value in that they tend to keep one from growing hungry before the next meal.

Science News Letter, August 24, 1935

IN SCIE

MEDICINE

Cancer Heals Itself; One Case in 100,000

THE RARE case of a cancer that spontaneously regressed or healed itself, an event that is estimated to occur "but once in one hundred thousand cases" is reported by Dr. M. Viola Rae of University of Toronto and Toronto General Hospital (*American Journal of Cancer*, Aug. 16).

The malignant tumor, discovered in the kidney during an exploratory operation upon a woman 61 years old, had been surrounded and penetrated by calcium deposits and thus had died. After the removal, the patient "made an uneventful postoperative recovery." There was only one small piece of the tumor that was found to be alive.

Just what caused the cancer to heal itself is not known. Dr. Rae suggests that "some complex form of local or general immunity developed, which established retrogressive changes in the tumor."

Science News Letter, August 24, 1935

ASTRONOMY

Faint Comet With Tail Sighted at Mount Wilson

A FAINT, tailed comet first discovered nine years ago has been rediscovered by Dr. Hamilton M. Jeffers of Lick Observatory. It is the Comas-Sola comet, now visiting the sun's vicinity after a journey into the outer reaches of the solar system.

At present in the constellation of Gemini, the Twins, famous for the stars Castor and Pollux, the Comas-Sola comet is 14th magnitude and can be seen only through the larger telescopes. Its head is diffuse and the tail is short, extending less than one degree from the main part of the comet.

The original discoverer of the comet was Dr. J. Comas-Sola, director of the Fabra Observatory, Barcelona, Spain, who found it Nov. 5, 1926.

Dr. Jeffers has reported the rediscovery to Harvard College Observatory which acts as a clearing house for American astronomical reports.

Science News Letter, August 24, 1935

E FIELDS

PHYSIOLOGY

Monkey Freezer Doubted By Medical Journal

THERE WILL be no murder trial in California over the death by freezing of Stephen Simkhovitch.

Of that the *Journal of the American Medical Association* (Aug. 17) is confident.

The medical journal is depending on California authorities to "express themselves with sufficient urgency on the subject" to prevent "Dr." Ralph Stanley Willard from proceeding with his experiment of freezing a human being in the belief that he can later restore him to life.

In an editorial, "Frozen Monkeys," the official publication of the American medical profession treats the extraordinary proposal lightly. Some investigators, it remarks, are convinced that the old process of substitution or sleight of hand was involved in the production of a live monkey in place of the frozen animal which "Dr." Willard claims spent three days in a refrigerator.

"No doubt the authorities will prevent Stephen Simkhovitch from submitting himself to the congealing process," the editorial states, "even though his fiancee has said the experiment is satisfactory to her. Perhaps she likes them cold."

The American Medical Association can find no evidence that Willard ever attended any school of medicine. Actually he is not a doctor at all, the organization declares. Its records show that he is presumably a chemist and that in Kansas City in 1927 he was associated with the promotion of some sort of tank treatment for many diseases.

Science News Letter, August 24, 1935

DIETETICS

Chow Mein Demonstrated As Good Vitamin Source

CHOW MEIN, stand-by of Oriental restaurants, may be unknown in China, but it is an excellent source of vitamins and a balanced meal in itself. This was revealed in a paper reporting the studies of Dr. LeRoy S. Weatherby and S. Murray of the University of Southern California, read before the American Chemical Society meeting at San Francisco.

Five white rats were fed on a diet of chow mein exclusively for six months after weaning. They showed no diet deficiency during the entire period and grew normally, although a trifle more slowly than rats fed on other balanced diets.

This slight slowness in growth was probably due to the composition of chow mein, the investigators believe, which is 82.36 per cent. moisture, and consequently lacking in solid matter.

Other experiments with groups of white rats showed that chow mein is not only rich in Vitamins A, B and D, but is also sufficiently supplied with minerals and proteins necessary to health.

Five grams of chow mein a day, in addition to a basal diet, was fed to each rat in several groups.

In the first group, it was sufficient to produce a normal growth curve for each rat. A gain of 4.5 grams in weight a week, for eight weeks was recorded for each rat in a second group, together with the disappearance of nervous symptoms present before the test. Complete cure of rickets was effected in four weeks in a third group.

If chow mein will produce similar beneficial effects in humans, as is to be expected from the animal tests, Chinese restaurants will have another good argument in soliciting patronage.

Science News Letter, August 24, 1935

PLANT PHYSIOLOGY

Buckwheat Gives Index To Trees' Mineral Needs

NUTRITION problems of human beings are sometimes solved by "trying it on the dog"—or a guinea pig. Buckwheat plants served as the "dog" in getting an index on the nitrogen requirements of young trees in the nursery of the New York State Conservation Department at Saratoga, E. J. Eliason reports (*Jr. Forestry*, June).

Buckwheat was planted in soil where several species of young evergreens had been growing. Its degree of greenness was taken as an index to the relative abundance of nitrogen left in the soil after the tree roots had taken their fill. The buckwheat developed its most marked yellowish hue on soil where red cedars had grown, indicating the greatest nitrogen hunger on the part of that variety. Spruces were next in their nitrogen requirement, and pines required least nitrogen.

Science News Letter, August 24, 1935

CHEMISTRY

Coffee Becomes Stale Through Action of Oxygen

COFFEE goes stale as it grows old because of the action of oxygen on the aromatic fatty substance in the beans that is responsible for their delicate flavor. It is a process analogous to the spoiling of butter. The only thing you can do about it is be sure you get freshly roasted coffee.

These results of research in coffee chemistry were reported before the meeting of the American Chemical Society by Dr. Robert O. Bengis of Yale University.

Experimental procedure followed by Dr. Bengis was basically simple. He extracted the fatty substance from a lot of freshly roasted coffee beans, and later on made a similar extraction from beans out of the same batch, when they had gone stale. Each sample of the extracted substance he exposed to oxygen, in an apparatus that would show how much of the gas the sample absorbed. The fresh material absorbed more than did the extract from the stale coffee, showing that the latter had already taken up a measurable quantity of oxygen, during the process of staling.

Similar tests on coffee marketed in vacuum tins showed that this method of packing affords only partial protection to the coffee. Even with the best of commercial vacuums, there seems to be some air left—enough, at any rate, to start oxidation in the aromatic fatty substance. Vacuum packing therefore, in Dr. Bengis' opinion, serves only to retard the staling process and will not stop it altogether.

Science News Letter, August 24, 1935

PLANT PATHOLOGY

Disease Comes to Rescue Of Dakota Flax Growers

FARMERS in North Dakota have been "getting the breaks" this year. A wet winter and spring ended the long scourge of drought, and at the same time abated the grasshopper pest.

Then a new plague arose to threaten from another angle: hordes of army worms, that made destructive inroads into the flax, a highly important crop in the Northwest. Now a disease has come to the rescue, wiping out the worms by billions.

The nature of the epidemic is not clear. Prof. C. I. Nelson, of the bacteriology department, is now endeavoring to isolate the organism.

Science News Letter, August 24, 1935

DEMOGRAPHY

American Industries Move To Middle-Sized Cities

Trend Is Away From Largest Population Centers, But Equally Away From Small Towns and Villages

AMERICAN industry is not leaving the big cities for the small towns. Instead, it is shifting both from big cities and small towns to medium-sized centers of population. During a period of over a generation, from 1899 to 1933, American industries have shown this tendency, steadily and strongly.

This is the conclusion of Daniel Creamer in a report just issued by the Study of Population Redistribution, and made public by the Wharton School of Finance and Commerce, University of Pennsylvania.

Widespread decentralization of industry to small villages would be a "revolutionary reversal of the trends thus far observed," according to Mr. Creamer.

If the Government were to foster the decentralization of factories to very small towns, it would be bucking the tide of natural trends, he says, pointing out that "the relative shrinkage in wage jobs over the period 1919 to 1933 was greatest in towns under 10,000 population.

Since 1933, there has been a slight deviation from the previous trend, in some industries. Four industries—men's clothing, knit goods, silk and rayon, and boots and shoes—showed absolute gains in number of jobs located in "non-industrial" counties of scattered population and small, isolated towns.

Union control and resistance to wage cutting was less in these industries than in any others, Mr. Creamer points out, and this movement to small towns was probably an attempt to escape paying high wages and submitting to unionization.

For the purposes of the survey, an industrial shift in the 200 leading "industrial" counties from large cities to their outskirts has been termed "diffusion." Nearly three-fourths ot all the wage jobs in manufacturing are concentrated in these 200 counties.

In contrast, "dispersion" is the name applied to movements of factories into the more than 2800 non-industrial counties having no cities over 100,000 population and with few inhabitants depending on manufacturing for a living.

During the 34-year period from 1899 to 1933, diffusion rather than dispersion was the rule, the report states.

Directed by Dr. Carter Goodrich, the population study will concern itself in a later publication with a more detailed account of the movement of particular industries during the past several decades.

Science News Letter, August 24, 1935

PLANT PATHOLOGY

Parasite Fungus of Pines Itself Victim of Parasite

THE WHITE pine blister rust fungus, most formidable enemy of this valuable timber tree, is itself the victim of another parasitic fungus, Dr. Ernest E. Hubert of the University of Idaho school of forestry points out (*Journal of Forestry*, June).

This parasite upon a parasite forms purple patches on the blister rust's outbreaks on the pines. It invades their tissues and prevents the rust from forming spores to reproduce itself. In the meantime the purple spores are spread by the wind and by insects to other masses of the blister rust.

Prof. Hubert states, however, that previous observations in Europe, and his own in this country, do not encourage him to expect material results from this purple fungus as a practical control of the blister rust epidemic. He feels that its attack is too erratic and uneven. Present methods of control will therefore continue to be necessary.

Science News Letter, August 24, 1935

PALEONTOLOGY

Siwalik Hills Yield Evolutionary Data

THE SIWALIK Hills of northern India, that lie between the headwaters of the Indus and Ganges, close to the Himalaya frontier, are yielding new clues to the evolution of races of animals that are no longer found in Asia. The fossils of these early forms, left in the rocks of the Siwaliks from fifty million years ago up to the beginning of the great Ice Age of the pleistocene, have been examined at the American Museum of Natural History by Dr. Edwin H. Colbert. His studies will be published soon in exhaustive monograph form.

One riddle toward the solving of which the Siwalik fossils have helped is the line of descent of the hippopotamus. The popular notion that this huge animal is related to the pigs has received a good deal of scientific agreement, for there are certain anatomical similarities, as well as general superficial resemblance. But Dr. Colbert has shown that the hippopotamus may have closer kinship with a long since extinct animal family known as the anthracotheres. The hippo is a

AN ENCHANTED WORLD AFLOAT

Reflecting in mirror perfection the snow-striped beauty of its own walls and the peak of its enchanted island, Crater Lake lifts itself out of an overheated summer world into a magic kingdom of the upper air.

kind of zoological second-cousin to the pig, but not a direct descendant.

Another line of animals which like the hippopotamus now exist only in Africa but are represented by fossils in the Siwaliks are the giraffes. Some of the extinct giraffe-like animals that once lived in this part of India had astonishing arrays of horns on their heads, instead of the pair of rather insignificant little stumps that crown modern giraffes.

As traced by Dr. Colbert, the earliest ancestors of the giraffe line originated in Asia. Their first offspring-genera migrated into Asia Minor and Europe. Some of their descendants, in turn, went back into Asia, as the bizarre, many-horned species of the Siwalik Hills, while two other lines of descent passed into Africa, where they still survive as the giraffe and the okapi.

Science News Letter, August 24, 1935

PALEONTOLOGY

Giant Turtle and Mosasaur Found in Alabama

GIANTS that were deadly enemies in the warm seas of the world 70,000,000 years or so ago have been found as fossil skeletons in the rocks of Alabama by Dr. Walter B. Jones, state geologist and director of the Alabama Museum of Natural History.

They were a tremendous sea turtle, whose bones still bear the marks of an enemy's teeth, and a mosasaur. Mosasaurs were kin-beasts of the great dinosaurs that ruled the land, and they were themselves no less the tyrants of the sea. They were huge, short-necked, paddle-limbed reptiles, with powerful jaws like crocodiles and long, snaky, flat-tailed bodies built for speed and maneuverability in the water. The tooth-marks on the turtle's bones were doubtless inflicted by a mosasaur, which either caught and slew the turtle or found and devoured its body after death from some other cause.

Discovery of the fossil remains of these two sea giants in what has long been solid land in Alabama shows how far the sea transgressed the Gulf slopes of America during the Cretaceous, or Great Chalk Age, when they were living. The wide central valley of this continent has been invaded by the sea many times during the long ages of geology, and the records of these millions of years of ebb and flow are written in the sedimentary rocks.

Both skeletons were in a more or less broken-up condition when found, but the pieces have been carefully cleaned and fitted together, and are now on display.

Science News Letter, August 24, 1935

ENGINEERING

Sodium Lighting System Will Illuminate New Bridge

Upper Deck to be Bathed in Light Equivalent to That of Thirty-Five Full Moons; New Lamps Very Saving of Power

THE LARGEST installation of sodium vapor lighting in the world will be installed on the new San Francisco-Oakland Bay bridge.

More than 35 full moons would have to shine simultaneously to give the same average intensity of light on the upper roadways of the bridge, which will be reserved for passenger high speed vehicles. General Electric engineers who designed them claim the golden yellow light of the sodium units has the greatest optical efficiency of any lighting system in existence.

Small objects can be seen at low intensities with greater ease under the soft, diffused light of the sodium lamps than under any other kind, tests indicate, and at the same time they are far more economical than ordinary lights.

The 10,000 lumen lamps used on the upper level of the bridge will produce approximately two-and-a-half times as much light as ordinary lights of the same energy consumption.

On the lower deck the 6,000 lumen units which will be installed to light the way for trucks and slower traffic will produce twice as much light as that obtained from incandescent bulbs of the same energy consumption.

Low Power Input

Lamps adding up to 6,720,000 lumens will be installed on the upper deck, and 1,500,000 lumens on the lower deck, making a grand total of 8,220,000 lumens for the entire bridge, the largest single order ever placed for sodium lights.

The new golden sodium lamps giving out 10,000 lumens require an energy input of only 220 watts, of which 185 watts or less goes to the lamp, the rest being used by transformers and other equipment. In comparison, ordinary incandescent lamps would require approximately 550 watts to produce 10,000 lumens.

Consisting of a special sodium-resistant glass, the bulb of the 10,000 lumen sodium lamp contains a small quantity of sodium and some neon gas.

When the lamp is cold, the first application of the current causes the neon gas in the lamp to glow brilliantly with its characteristic red color. Thirty minutes is needed to store up enough heat to vaporize the sodium fully and cause the lamp to shed its characteristic orange-yellow light.

Science News Letter, August 24, 1935

GENERAL SCIENCE

Scientific Expedition Scales Hawaii's Highest Mountain

MAUNA KEA, loftiest of Hawaiian mountains, is being explored by an expedition of the Hawaiian Academy of Science. The slopes rising to its 13,784-foot summit are thickly crowded with dense forests and undergrowth, making the ascent difficult but at the same time affording unparalleled wealth to searching naturalists.

Data sought by the expedition are many-sided. The personnel includes students of botany, zoology, geology, geography, archaeology, forestry, and number of other sciences.

Amateur short-wave radio carried word of the Mauna Kea expedition to Station W3BWT in Washington, D. C., from Station K7EFW at Hilo, Hawaii. The message was signed by Dr. Constance Hartt, one of the botanists of the expedition.

Science News Letter, August 24, 1935

PHYSIOLOGY

Muscle Tone Differentiates Living Man From Corpse

BESIDES the heart and the vasomotor mechanism — the system of blood vessels and the sympathetic nerves controlling them—there is a third factor important in maintaining the adequate blood circulation. It is the system of muscular reactions which promote the flow of blood back to the heart through the veins.

This is pointed out by Prof. Yandell Henderson, professor of applied physiology, Yale University.

"Clear evidence has only recently been developed that in the healthy body, even during complete bodily rest, the tonic contractions of the muscles maintain continually a pressure within the tissues sufficient to send a continuous stream of blood through the veins to the heart," Prof. Henderson said. "This pressure between the fibres of a muscle under tension arises in much the same way that pressure between strands of a rope is produced by a longitudinal pull upon the rope."

The tonus—which may be roughly described as the liveliness—of human muscles, and thus of the whole body, distinguishes a living man from a corpse "more fundamentally than any other feature," states Prof. Henderson. Among influences which decrease tonus are anxiety, anaesthesia—particularly spinal anaesthesia—and surgical shock.

Tonus returns fully only with the recovery of vitality and health, Prof. Henderson adds. It is increased temporarily by frequent change of position—even turning over in bed—by strychnine and by inhaling carbon dioxide.

Science News Letter, August 24, 1935

ARCHAEOLOGY

"Stone-Plated" Florida Mound Resembles Mexican Pyramids

COVERED with thick slabs of limestone, a rectangular Indian mound recently discovered on Key Largo, off the southern tip of Florida, has some features of resemblance to the much more highly developed pyramids built by the Indian nations of Yucatan and Mexico. It also has some suggestions of the type of mounds built in the Ohio and Upper Mississippi valleys by the ancient Hopewell Indians.

Preliminary examination of the mound has been made by Matthew W. Stirling, chief of the Bureau of American Ethnology of the Smithsonian Institution, who hopes to return and carry out a complete excavation next winter. Mr. Stirling also intends to investigate statements made to him by Seminole Indians, that there is another stone-faced mound in the middle of the Everglades.

The Key Largo mound is in the shape of a very low, rectangular, truncated pyramid. The stone slabs, averaging six inches thick and roughly a foot and a half on the sides, are not dressed smooth but are fitted together as closely edge to edge as their natural shape permits.

The Maya and Mexican pyramids were much higher rectangular earth mounds, flat-topped and covered with stone-slabs, which, however, are dressed smooth and fitted into regular masonry courses. The mounds of the Ohio valley often have a few rows of stone laid about their bases, but the main structure was left as naked earth, over which grass and trees have grown.

A completely stone-faced mound is a wholly new thing in Florida, where all previously known structures of the kind have been simple heaps of sand.

The purpose of the Key Largo mound cannot be known until it is excavated. Some mounds contain more or less elaborate burials, others seem to have served as foundations or platforms for ceremonial buildings. The flat-topped, stone-faced pyramids of Yucatan and Mexico belonged to the latter class, usually bearing temples on their summits.

Science News Letter, August 24, 1935

RIIS EXPEDITION

Scientific around world exploration expedition requires several adventurous men scientifically inclined. Must be independent and self-supporting. Unusual opportunity to participate in up-to-minute research work, collection of specimens for museums, aquaria, zoos, etc. Recording Cosmic Rays, etc. Profit sharing feature.

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BACTERIOLOGY

Sunlight Has Little Effect On Bacteria in Sea Water

BACTERIA that live in the sea are relatively safe from the action of sunlight, it has been discovered by Drs. Claude E. Zobell and George F. McEwen of the Scripps Institution of Oceanography, the University of California. They report (*Biological Bulletin*, February), that in their laboratory experiments "sunlight has a feeble lethal effect on bacteria in the uppermost few millimeters of sea water, but even shallow layers of sea water are not sterilized by prolonged exposure."

"Virtually no bactericidal radiations penetrate sea water 3 meters," they continued, "and the intensity is materially reduced by passage through 10 centimeters of sea water."

Science News Letter, August 24, 1935

FORESTRY

Portable Power Saw Makes Pruning Easier

LIFE grows easier for the forester. No longer will it be necessary for him to wear out his shoulders pushing and pulling a saw on the end of a long pole, pruning trees to make them produce better timber.

At the U. S. Forest Products Laboratory a light-weight power saw has been developed. It consists of a small gasoline engine, that drives a small circle-saw mounted on a long pole, by means of a flexible shaft. The whole kit can be dragged about the woods on a toboggan or light wheeled carriage.

Use of the portable power saw greatly increases the amount of work a forest worker is able to accomplish, and at the same time it produces cleaner cuts that heal over more quickly.

The new tool is described by John B. Cuno, of the Laboratory (*Journal of Forestry*, August).

Science News Letter, August 24, 1935

ECOLOGY

Mediterranean Fruit Fly Causes Rise of New Industry

AN INSECT from Europe has been responsible for the establishment of a new food industry in Hawaii.

The insect is the Mediterranean fruit fly, which caused a furor in the southern states a few years ago when it gained a temporary foothold in Florida. It has unfortunately long been established in Hawaii, so that most of the islands' fruits cannot be exported to the continental United States.

The industry is the manufacture of avocado paste, used in salads. Hawaii grows good avocados but the "Medfly" embargo keeps them at home. So the growers have turned to processing them into the palatable paste which is beginning to find an outside market.

Science News Letter, August 24, 1935

BOTANY

Trees Grow on Stilts In Great Smoky Mountains

VISITORS to Great Smoky Mountains National Park are often puzzled by finding, along moist slopes bathed in almost perennial mist, birch trees that seem to stand on stilts. Instead of having their roots embedded in the earth in orthodox tree fashion, these birches are apt to be standing up, as though on tiptoe, on anywhere from three to half-a-dozen roots that lift the base of the trunk a foot or more clear of the earth. Some of the trees look almost like gigantic insects, spraddling along over fallen logs and other obstacles.

The factor responsible for this strange tree behavior is the perpetual mist of the Great Smokies, that gives the mountains their name, explains Dr. Stanley A. Cain, research associate of the Waterman Institute of Indiana University. By keeping everything always moist, it makes possible the germination of seeds on fallen logs, on top of mossy rocks, and in many other places that would be too dry in ordinary woods, where the precipitation is lower and the evaporating power of the air greater.

The seedlings thus started send their roots down the moist sides of their supports. These roots take hold in the soil. Eventually the original supporting log decays and disappears, leaving the young tree literally "up in the air," supported only by the multiple "false trunks" formed by its roots.

These birches of the Great Smokies are emulating the behavior of the famous banyan trees of the Orient, and the strangling-fig vines of the tropics generally. The banyan is not a tree, properly speaking, but a sprawling vine. It gets its start in the branches of a tree of some other species, and sends long roots down to take hold in the soil.

Finally it smothers or strangles its supporting tree. But by this time its numerous dangling roots have become solidly established as pillar-like false trunks. The banyan then goes on indefinitely, spreading in all directions and sending down scores of new supporting roots, until it is a veritable one-tree grove.

Science News Letter, August 24, 1935

BANYAN BIRCHES

A log once lay between their straddling roots, but has long since decayed and vanished.

●RADIO

Tuesday, August 27, 3:30 p. m., E.S.T.

BEFORE COLUMBUS CAME, by Dr. H. J. Spinden, Curator of Prehistoric and Primitive Art, Brooklyn Museum.

Tuesday, September 3, 3:30 P. M., E.S.T.

OUR HIGHWAYS, ARTERIES OF THE NATION, by Dr. S. S. Steinberg, University of Maryland.

In the Science Service series of radio addresses given by eminent scientists over the Columbia Broadcasting System.

ENTOMOLOGY

Female Katydids Lisp Faint Answers to Males

KATYDIDS, shrilly shouting their interminable arguments over an imaginary Katy's responsibility or lack of it for some unknown deed, are all males. Their noise is really a lovesong, intended for the charming of some coy, green-winged damsel of their own kind.

But the female katydid is "not so dumb after all," reports Dr. B. B. Fulton, of North Carolina State College.

"It has often been supposed that the female was so charmed by the musical efforts of the male that she sought out his leafy abode," he says. "But there is now evidence to show that in some species at least she stays at home and merely sends out a katydid code signal meaning 'here I am if you want me.' "

Dr. Fulton was led to his discovery of the female katydid's ability to speak for herself when the time comes, by hearing very faint responses on the part of unmated females when males were raising a disturbance in the neighborhood. These were tiny lisping sounds, no doubt the katydid equivalents of a shy "yeth, thir."

They must have required extraordinary hearing abilities on the part of the males, Dr. Fulton comments. But they sufficed. The ardent suitors sought and found their waiting mates.

Female katydids make their very faint responses by rubbing special surfaces on their wings together, just as the males do. Only the file-teeth used for the purpose are much smaller than those on the males' wings. Dr. Fulton examined a large number of katydid specimens in his collection, and found that in many species some kind or other of these file-toothed voice-organs on the wings were present.

Science News Letter, August 24, 1935

ENTOMOLOGY

Wasps Squeeze 'Balloon Eggs' Through Very Narrow Tube

WASPS that lay "balloon eggs" through an opening only one-twelfth their diameter, and that build "sippers" like soda straws to obtain food which they have never seen are the extraordinary insects described by Dr. B. B. Fulton of North Carolina State College.

The insects are tiny wasp-like creatures that lay their eggs on the larvae of the grain moth, a destructive pest of corn. The smaller wasp larvae feed on the grain-moth larvae, destroying them and thus unconsciously doing the human race a good turn.

But to get the egg to the moth larva is no easy task for the female wasplet. First she must drill a hole through the grain in which the larva is feeding. This she does with her ovipositor, which is a combination of drill, probe, sting, and egg-laying device.

Having reached the larva's lair, she stings it into a paralytic state. Then the egg-laying process begins. The egg is squeezed, shell and all, through the channel of the ovipositor, although it is a dozen times the diameter of this tiny tube. It bulges out like a small balloon as it emerges from the end.

The egg is so large that part of it must still be in the insect's body while the other end is being squeezed out of the tube. Dr. Fulton offers the opinion that it "must

flow through like sand in an hourglass." Yet the egg assumes a normal egg-shape after it is laid, none the worse for its experience. Laboratory experiments, pulling and squeezing these tiny eggs, showed a remarkable degree of toughness and resiliency.

The adult female of this species also feeds on the grain moth larvae herself, though she never sees them. She does this by puncturing a larva with her ovipositor. While the tip is still imbedded in the stung larva, the ovipositor exudes a viscous fluid which hardens on the outside, forming a tube.

The insect then withdraws her ovipositor, leaving the tube intact. Through this the insect drinks the blood of the larva "as daintily as a college girl sipping soda water through a straw."

Science News Letter, August 24, 1935

ENTOMOLOGY

Did Spiders Teach Man The Weaving of Nets?

See Front Cover

GREEK legend has it that Arachne, the first mortal spinster, learned so perfectly Athene's art of weaving that she became presumptuous enough to compete against the goddess, and as a punishment was transformed into a spider.

Whatever may be the justification for the old story, it would seem at least as likely that men learned from spiders the weaving of nets to trap birds and other small quarry, more directly than women did the art of weaving cloth. While nobody knows when or how nets were actually invented, it is easy to speculate that some Neolithic hunter, idling among the riverside reeds on a day when birds were shy, may have watched a spider spread her net for her own winged prey, and so received the inspiration to try something of the same kind to catch his food with more certainty and less labor.

Arachne may have taught men the use of birdlime, too, for the cross threads in her web are sticky with a glue of her own making, which is the ultimate prey-catching device that makes the whole mechanism effective.

So fine are the treads, even thus coated, that under ordinary circumstances they are quite invisible. But after a cool night they may be so beaded with tiny dewdrops that they can be photographed. It was in this state that Cornelia Clarke caught the web shown on the cover of this number of the SCIENCE NEWS LETTER.

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ECOLOGY

Prairie's Own Soil Management Superior to That of Man

MAN, the land-hungry, the land-exploiting, ultimately the land-ruining, can learn much from the prairie grasses and herbs that formed the original sod in the Corn Belt states, some fragments of which still remain unplowed, especially in Nebraska and the Dakotas. Studies reported by Drs. J. E. Weaver and Evan L. Flory of the University of Nebraska indicate that the soil management practised by the prairie sod excels that carried on by man in practically every important respect.

Man's soil management is a business of extremes. His tillage, for field crops such as corn and cotton, keeps the soil stirred and loose all the time, a ready prey for erosion by wind and water. Prairie sod thrives without this constant disturbance—earthworms are plows enough. Man strives to give a field to a single plant species as a monopoly, and to kill all other growths as weeds. Prairie sod turns the acres into a mixed community of many species; there is competition in it, to be sure, but there is a sort of tolerance even in the competition. Man's crops cover the soil only during a part of the growing season; before planting and after harvest the soil is naked to the attack of the elements. Prairie sod is a constant protecting mantle; the seeds of its various constituent plants ripen at different times the whole summer through.

Cooler Air Over Sod

Quantitative measurements of climatic and other factors bring out dramatically the superiority of sod-economy over plow-economy. On a given summer day, the air in a cornfield at four feet above the ground was hotter by four degrees than air at the same level over the prairie. At four inches the difference was 11 degrees, at the soil surface itself the cornland was 21 degrees hotter than the prairie sod, and just below the soil surface the cornland was 38 degrees hotter.

This difference is reflected not only in the greater strain put on the endurance of the plants themselves, but in the conditions which the important nitrogen-fixing microorganisms of the soil have to face. The cornland was too hot for them to live, while the temperature of the prairie sod soil was still within survival limits.

The evaporating power of the air showed like differences. At the height of the plants, it was 27 per cent. greater over the cornfield; at half the height, 106 per cent. greater, and near the soil surface the difference was 68 per cent. to the disadvantage of the corn. These heightened evaporation rates are of critical significance in time of drought, when soil water conservation is of supreme importance.

Drs. Weaver and Flory do not contend that all the West should be returned to grass. There must obviously be corn and wheat, alfalfa and soybeans. Nevertheless, they contend, "we may profitably consider the natural environment. Not until the native environment in its relations to water, humidity, temperature fluctuations and other critical factors of both air and soil have been compared with that of overgrazed and cropped areas will it be known how widely we are departing from Nature's plan of a stable environment."

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So supplementary means must be devised. Important are flood-water reservoirs, which will hold back part of the water until the rest has been drained off, and then release their impoundings as rapidly as possible. There have been proposals to build such flood checks right in the Ohio itself, as well as in some of the other larger tributaries of the Mississippi from the west. These the committee doubts, but it gives its approval to a considerable number of flood-water dams on other tributaries, and even suggests that these may be the key to flood defense.

But in spite of all this, floods will still develop. Here a third strategy comes into play. If you cannot hold your adversary back, yield and let him rush through a path of your own choosing. This is the principle of the so-called floodways of the lower Mississippi. These are auxiliary flowage paths for the river, with guide levees along their sides. In normal years they remain empty, and may even be farmed. But when a Great Flood comes, once in a generation or oftener, the weaker "fuse plug" levees that close their upper ends are permitted to give way, and the surplus waters pour through on their way to the sea.

The committee also recommends a unification of the entire levee system of the lower river, with established standards of construction and height, and a better coordinated system of administration. In the past, each community has tended to regard its own flood protection as its private problem; so much so, that we have frequently had to witness the scandalous spectacle of American citizens dynamiting the levees that protected the property of other American citizens, to relieve the river's pressure on their own front.

Such a too-rugged individualism, more suggestive of the doings of Ur and Kish and Lagash on the Tigris and Euphrates thousands of years ago than of what we would like to believe of our America of today, will become forgotten legend if the persuasions of the Mississippi Valley Committee are listened to:

"Life in the Mississippi Valley of the future need not be poverty-stricken or precarious. The forces making for health and well-being, once they are controlled, are greater than those which make for disaster. The quality of life in the Valley can be enormously improved. It need not go the way of the valley of the Nile, the valleys of the Tigris and Euphrates, where sands have drifted into old irrigation ditches and the sites of opulent gardens, or the stripped valleys of China. We have knowledge that the older civilizations lacked. If we synthesize that knowledge to make our plans, if we put a common purpose above local jealousies and conflicts of interest, the future is in our own hands."

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BOTANY

Cannas, Flowers in U. S., Starch Source in Hawaii

CANNAS may be just flowers in the continental United States, but in Hawaii they are a possible source of commercial starch, according to President David Livingston Crawford of the University of Hawaii.

Their thick, tuberous roots, rich in starch, grow abundantly and to extraordinary size in average sugarcane land. Sugar mill machinery needs to be modified but little to extract their starch. Canna starch has been found advantageous for use in putting a smooth finish on paper.

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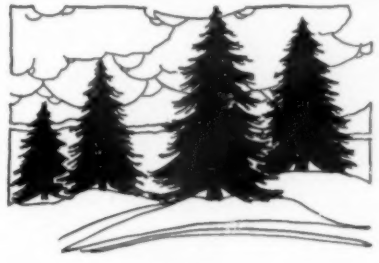
The earlier a cross-eyed child receives glasses, surgical treatment, or eye-training, under competent medical guidance, the greater the hope of correcting the defect.

CHEMISTRY

NATURE RAMBLINGS *by Frank Thone*



Lignin

WHAT is one man's meat may, under another guise, be the same man's poison.

Chemistry, and the great family of industries it has mothered, are notoriously indebted to coal: dyes, perfumes, solvents, explosives, a whole worldful of things come from coal.

Coal exists because woody plants, millions of years ago, contained the same stuff that makes their remote descendants woody today: lignin. Lignin, a chemical second cousin to starch and cellulose, is a hard, tough, refractory stuff, exceedingly difficult to digest; even bacteria, molds and other organisms of decay cannot do much with it, and leave the lignin remains of a log in the soil long after they have used up the softer cellulose. That is why the remains of Coal-Age plants persisted long enough to become buried in their own accumulated masses, and eventually to turn into coal.

But that same refractory indigestibility of lignin is the despair of the chemist today. It forces wood-using chemical factories to throw away just half of every stick they grind up for cellulose, and it produces a bulky, troublesome waste that is in everybody's way.

At the meeting of the American Chemical Society in San Francisco, Prof. Walter M. Fuchs of the New Jersey Agricultural Experiment Station told what chemistry can do with lignin today—which isn't much—and how soon the science runs into a blank wall—which is very soon indeed.

"For each ton of cellulose produced, one ton of solid waste substances is obtained, and hundreds of thousands of tons of this material are available each year," he said. "The discharge of these liquors in the rivers endangers the fish and does not contribute to the beauty and amenity of the country.

"Inventors have tried to produce adhesive, tanning and plastic materials starting with these waste liquors. Lignin may also be utilized in the repair and construction of roads; but in general, utilization of lignin and lignin-containing waste liquors is still an open problem.

If anything in the chemical world cries aloud for liberally supported research and lots of it, that thing is lignin.

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CHEMISTRY

Pigment Differences Make Paints Incompatible

HIDDEN conflicts between "antagonistic" paints cause the failure of many exterior paint jobs through premature cracking, scaling, and peeling.

In fact, many paints, like people, are mutually incompatible and have an antipathy to each other, chemists of the Department of Agriculture's Forest Products Laboratory discovered recently. This is due mostly to differences of the pigments.

When a house or building exposed to the weather is coated with a paint with an antipathy to the previous paint job, there is likely to be early trouble. For example, if a formerly brown or green building is painted white without removing the old paint, peeling will be the probable result.

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First Glances at New Books

Biography

ALBERT EINSTEIN, A PICTURE OF HIS LIFE AND HIS CONCEPTION OF THE WORLD—David Reichinstein — *Edward Goldston, Ltd., 25 Museum St., London, W.C.1.*, 255 p., 12 shillings. This book is essentially a collection of Einstein documents in the years between 1910 and 1933, relating to political, religious and economic topics, rewoven into a continuous whole by the author. They tell the story of Einstein the man and not the scientist. Only the final chapter discusses Einstein's theory of relativity.

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Chemistry

COMBUSTION FROM HERACLEITOS TO LAVOISIER—Joshua C. Gregory—*Edward Arnold & Co., London*—231 p., 10s, 6d. Mr. Gregory, who is lecturer in chemistry at Leeds University, tells the story of fire and what man thought it was through the ages from 500 B.C. to the late years of the 18th century. It was then that Lavoisier finally succeeded in presenting convincing arguments which overthrew the phlogistic concept of heat and its relation to chemistry.

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Botany

THE HERBACEOUS FLOWERING PLANTS IN THE VICINITY OF ORONO, MAINE—Eugene Cecil Ogden—*University Press, Orono, Maine,* 77 p., 50c. (paper), $1 (boards). A useful addition to the growing literature of local floras.

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Psychology

A TEXTBOOK OF EXPERIMENTAL AND THEORETICAL PSYCHOLOGY — Ernest Burton Skaggs—*Christopher Pub. House,* 426 p., $4. A text for normal schools and colleges by the professor of psychology at Wayne University.

Science News Letter, August 24, 1935

Linquistics

TUBATULABAL GRAMMAR — Charles F. Voegelin—*Univ. of California,* 135 p., $1.25. About a hundred Indians in the southern Sierra Nevada speak this language, which is classed as one of the main branches of the Shoshonean language group.

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Ethnology

TUBATULABAL TEXTS — Charles F. Voegelin—*Univ. of California,* 55 p., 50c. Myths, anecdotes, and other texts incidentally gathered during field trips while the author was making a grammatical analysis of the Tubatulabal Indian language in California.

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Botany

CONCERNING THE BADIANUS MANUSCRIPT, AN AZTEC HERBAL, "CODEX BARBERINI, LATIN 241" (VATICAN LIBRARY) — Emily Walcott Emmart — *Smithsonian Inst.,* 14 p., 4 pl., 40c. A brief account of an exceedingly important but hitherto neglected document, being the earliest known herbal published in the New World. It was written in Aztec by one Indian and translated into Latin by another in 1552, both men having been educated in a college founded in 1536 in Mexico City, especially for the teaching of Indians.

Science News Letter, August 24, 1935

Ornithology

FAMILIAR BIRDS OF THE PACIFIC SOUTHWEST—Florence V. V. Dickey, *Stanford Univ. Press,* lviii+241 p., $3.75. Rich with colored photographic illustrations (102 full pages), made easy of use with quick-identification "keys," this compact little book should become widely popular in the region for which it is designed.

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Chemistry

LITHIUM; THEORETICAL STUDIES AND PRACTICAL APPLICATIONS—Hand Osborg—*Electrochemical Society, Columbia Univ.,* 68 p., $1.10.

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Physics

EXPOSÉS D'ANALYSE GÉNÉRALE—VOL. IV—LE ROLE DES ESPACES ABSTRAITS EN PHYSIQUE NOUVELLE—Jean-Louis Destouches — *Hermann et Cie., Paris,* 66 p., 18 fr.

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Mathematics

EXPOSÉS MATHÉMATIQUES—VOL. XI—ARITHMÉTIQUE ET GÉOMÉTRIE SUR LES VARIÉTÉS ALGÉBRIQUES — André Weil— 16 p., 6 fr.; VOL. XII—QUELQUES PROPRIÉTÉS DES VARIÉTÉS ALGEBRIQUES—Paul Dubriel—31 p., 10 fr.; *Hermann et Cie., Paris.*

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Radio

THE FUNDAMENTALS OF RADIO; 2d ed.—R. R. Ramsey—*Ramsey Pub. Co.,* 426 p., $3.50. It has been six years since Prof. Ramsey's first edition of this popular radio textbook appeared. The advent of multigrid tubes has been only one basic improvement among many which have been developed in the meantime. As before the book adheres to a minimum of mathematics, and assumes merely a one-year course in physics as background. It will be useful for the radio amateurs who are ever looking for some reliable and understandable book on radio communication.

Science News Letter, August 24, 1935

PHYSICS

ELECTRON EMISSION AND ADSORPTION PHENOMENA—J. H. de Boer—*Cambridge: At The University Press; New York: The Macmillan Co.,* 409 p., $5.50. Advanced technical treatise on the phenomena underlying photoelectric cells and radio tubes, namely the study of adsorption on surfaces by electron emission. Using a physical-chemical point of view, the book not only gives a description of the phenomena but strives to give satisfactory interpretations of them from the molecular viewpoint.

Science News Letter, August 24, 1935

Child Study

THE ADOLESCENT IN THE FAMILY—White House Conference on Child Health and Protection—*Appleton-Century*—473 p., $3.00. Another one of the very comprehensive and interesting reports of the White House Conference subcommittees.

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Paleontology

FOURTEEN NEW SPECIES OF FORAMINIFERA — Joseph A. Cushman — *Smithsonian Institution,* 9 p., 3 plates, 10 cents.

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Paleontology

TWO NEW FORAMINIFERA OF THE GENUS TEXTULARIA—Cecil G. Lalicker —*Smithsonian Institution,* 2 p., 1 plate, 5 cents.

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